CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 92-100
NPDES NO. CA0005096

AMENDING WASTE DISCHARGE REQUIREMENTS FOR:

PACIFIC REFINING COMPANY
HERCULES REFINERY
CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter called the Board), finds that:

1. The Board issued Pacific Refining Company, Hercules Refinery (hereinafter called the discharger), Waste Discharge Requirements under the National Pollutant Discharge Elimination System (NPDES) permit number CA0005096, Order No. 90-104 on July 18, 1990. Order No. 90-104 is amended by Order Nos. 91-026 and 91-099.

2. The purpose of this Order is to add chronic toxicity effluent limitations to the discharger's NPDES permit. The limitations and provisions required in this Order are based on State plans and data generated by the Effluent Toxicity Characterization Program (ETCP). These are discussed in more detail in the findings below.

3. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986, and the State Water Resources Control Board (State Board) approved it on May 21, 1987. This Basin Plan initiated the Effluent Toxicity Characterization Program (ETCP) in which 25 dischargers (21 majors and 4 minors) were required to monitor their effluent using critical life stage toxicity tests. The purpose of the ETCP is to generate information on toxicity test precision, test species sensitivity, and effluent variability to allow development of appropriate chronic toxicity effluent limitations.

4. On April 11, 1991, the State Board adopted the Water Quality Control Plan For Enclosed Bays and Estuaries of California (Enclosed Bays and Estuaries Plan). This plan establishes an ambient water quality objective outside discharge mixing zones of no chronic toxicity, expressed as an objective of 1 TUc (chronic toxicity unit).

5. The Enclosed Bays and Estuaries Plan specifies that a chronic toxicity effluent limitation is required in discharge permits for industrial discharges with reasonable potential to cause toxicity in receiving waters.

6. The discharger participated in the ETCP and have completed the required tests. The ETCP data show sufficient chronic toxicity in the discharger's effluent to warrant toxicity identification and reduction evaluations (TIE/TRE). The test species exhibiting chronic toxicity are Echinoderms and *Menidia beryllina*. The chronic toxicity was frequently greater than 24 TUc. Based on these data, the discharger has a reasonable

potential to cause toxicity in receiving waters, and chronic toxicity effluent limitations are necessary.

7. The discharge of Waste 001 (effluent from the process wastewater treatment plant) by the discharger is classified as deep water discharge because it is through an outfall with a diffuser. The chronic toxicity effluent limitation specified in this Order is based on a dilution ratio of 10:1.

8. Since completion of the ETCP, the discharger has made some modifications to the treatment plant which may have improved effluent quality. However, no data has been generated to demonstrate that the chronic toxicity has been reduced as a result of the modifications. The Executive Officer has required the discharger, pursuant to California Water Code Section 13267, to conduct a TIE to determine the cause of the chronic toxicity. The TIE is underway and this Order will require the discharger to continue with the effort.

9. The amendment of waste discharge requirements for this discharge is exempt from the provisions of Chapter 3 (commencing with Section 21000 of Division 13) of the Public Resources Code (CEQA) pursuant to Section 13389 of the California Water Code.

10. The Board has notified the discharger and interested agencies and persons of its intent to amend waste discharge requirements, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

11. The Board, in a public meeting, heard and considered all comments pertaining to the amendment of waste discharge requirements for the above discharges.

IT IS HEREBY ORDERED that the NPDES Permit for the discharger be amended to include the following:

A. Chronic Toxicity Effluent Limitation:

There shall be no chronic toxicity in Waste 001 as discharged, above the levels defined by:

a. an eleven sample median value[1] of 10 TUc[2]; or

b. a 90 percentile value[3] of 20 TUc[2].

[1] If five or more of the past ten or less samples show toxicity greater than 10 TUc, then a test sample showing chronic toxicity greater than 10 TUc represents consistent toxicity and a violation of this limitation.

[2] A TUc equals 100/NOEL. The NOEL is the no observable effect level, determined from IC, EC, or NOEC values. These terms and their usage in determining compliance with the limitations are defined in Attachment A of this Order. The

NOEL shall be based on a critical life stage test using the most sensitive test species as specified by the Executive Officer. The Executive Officer may specify two compliance species if test data indicate that there is alternating sensitivity between the two species. If two compliance test species are specified, compliance shall be based on the maximum TUc value for that discharge sample based on a comparison of TUc values obtained through concurrent testing of the two species.

[3] A test sample showing chronic toxicity greater than 20 TUc represent consistent toxicity and a violation of this limitation if one or more of the past ten or less samples shows toxicity greater than 20 TUc.

B. Provisions:

1. Pursuant to 40 CFR 122.44, 122.62, and 124.5, the definition of the NOEL contained in Attachment A of this Order may be modified based on guidance issued by the State Board, prior to the Permit expiration date.

2. If there is a violation of the chronic toxicity effluent limitation, the discharger shall conduct a chronic toxicity reduction evaluation (TRE), which shall initially involve a toxicity identification evaluation (TIE). The TIE shall be in accordance with a work plan acceptable to the Executive Officer. The TIE shall be initiated within 30 days of the date of violation. The objective of the TIE shall be to identify the chemical or combination of chemicals that are causing the observed toxicity. Every effort using currently available TIE methodologies shall be employed by the discharger. As toxic constituents are identified or characterized, the discharger shall continue the TRE by determining the source(s) of the toxic constituent(s) and evaluating alternative strategies for reducing or eliminating the constituent(s) from the discharge. All reasonable steps shall be taken to reduce toxicity to the required level. The Board recognizes that identification of causes of chronic toxicity may not be successful in all cases. Consideration of enforcement action by the Board will be based in part on the discharger's actions in identifying and reducing sources of consistent toxicity.

3. The discharger shall conduct screening phase compliance monitoring in accordance with a proposal submitted to and acceptable to the Executive Officer. The proposal shall contain, at a minimum, the elements specified in Attachment B of this Order. The purpose of the screening is to determine the most sensitive test species for subsequent routine compliance monitoring for chronic toxicity. Screening phase compliance monitoring shall be conducted under either of these two conditions:

   a. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to pretreatment, source control, and waste minimization efforts; or

b. Prior to Permit reissuance, except when the discharger is conducting a TIE and/or TRE. Screening phase monitoring data shall be included in the NPDES Permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

4. The discharger shall continue diligently with toxicity identification evaluation (TIE) efforts on the treatment plant effluent in accordance with work plans acceptable to the Executive Officer, and shall pursue toxicity reduction evaluations (TRE) as appropriate. TIE/TRE efforts shall continue until the discharger demonstrates that the discharge complies with the chronic toxicity effluent limitation. The Board recognizes that identification of causes of chronic toxicity may not be successful in all cases. Consideration of enforcement action by the Board will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity.

5. Within three months after completion of the TIE/TRE required by the above provision, the discharger shall:

   a. commence routine compliance monitoring in accordance with the attached Self-Monitoring Program modifications. The Self-Monitoring Program may be amended by the Board pursuant to EPA regulations 40CFR122.62, 122.63, and 124.5; and

   b. submit a general TIE work plan acceptable to the Executive Officer. If violation of the chronic toxicity effluent limitation occurs, the discharger shall implement the TIE work plan within 30 days of the date of violation.

C. This Order shall serve as modification of National Pollutant Discharge Elimination System permits pursuant to Section 402 of the Federal Water Pollution Control Act, or amendments thereto, and shall become effective on the date of adoption provided the Regional Administrator, Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, the modifications shall not become effective until such objection is withdrawn.

I, Steven R. Ritchie, Executive Officer do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on August 19, 1992.

STEVEN R. RITCHIE
Executive Officer

Attachments:
Attachment A - Definition of NOEL
Attachment B - Screening Phase Monitoring Requirements
Amendments to Self-Monitoring Program

ATTACHMENT A

DEFINITION OF
NO OBSERVED EFFECT LEVEL

No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25% of the test organisms.

Inhibition Concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal, non-quantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25% reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as EPA's Bootstrap Procedure.

No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

ATTACHMENT B

SCREENING PHASE MONITORING REQUIREMENTS

A. Screening phase compliance monitoring is required:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to pretreatment, source control, and waste minimization efforts; or

2. Prior to Permit reissuance. Screening phase monitoring data shall be included in the NPDES Permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

- Use of test species specified in Table B-1 and B-2 (attached), and use of the protocols referenced in those tables, or as approved by the Executive Officer;

- Two stages:

  Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on Table B-3 (attached); and

  Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results and as approved by the Executive Officer.

- Appropriate controls; and

- Concurrent reference toxicant tests.

C. The discharger shall submit a screening phase proposal to the Executive Officer for approval. The proposal shall address each of the elements listed above.

TABLE B-1
CRITICAL LIFE STAGE TOXICITY TESTS FOR ESTUARINE WATERS

SPECIES	EFFECT	TEST DURATION	REFERENCE
alga (Skeletonema costatum) (Thalassiosira pseudonana)	growth rate	4 days	1
red alga (Champia parvula)	number of cystocarps	7-9 days	5
giant kelp (Macrocystis pyrifera)	percent germination; germ tube length	48 hours	3
abalone (Haliotis rufescens)	abnormal shell development	48 hours	3
oyster (Crassostrea gigas) mussel (Mytilus edulis)	abnormal shell development; percent survival	48 hours	2
Echinoderms (urchins - Strongylocentrotus purpuratus, S. franciscanus); (sand dollar - Dendraster excentricus)	percent fertilization	1 hour	4
shrimp (Mysidopsis bahia)	percent survival; growth; fecundity	7 days	5
silversides (Menidia beryllina)	larval growth rate; percent survival	7 days	5

TOXICITY TEST REFERENCES

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for conducting static 96-hour toxicity tests with microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.

2. American Society for Testing Materials (ASTM). 1989. Standard Practice for conducting static acute toxicity tests with larvae of four species of bivalve molluscs. Procedure E 724-89. ASTM, Philadelphia, PA.

3. Anderson, B.B. J.W. Hunt, S.L. Turpen, A.R. Coulon, M. Martin, D.L. McKeown, and F.H. Palmer. 1990. Procedures manual for conducting toxicity tests developed by the marine bioassay project. California State Water Resources Control Board, Sacramento.

4. Dinnel, P.J., J. Link, and Q. Stober. 1987. Improved methodology for sea urchin sperm cell bioassay for marine waters. Archives of Environmental Contamination and Toxicology 16:23-32. and S.L. Anderson. September 1, 1989. Technical Memorandum. San Francisco Bay Regional Water Quality Control Board, Oakland, CA.

5. Weber, C.I., W.B. Horning, II, D.J. Klem, T.W. Neiheisel, P.A. Lewis, E.L. Robinson, J. Menkedick, and F. Kessler (eds.). 1988. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. EPA-600/4-87/028. National Technical Information Service, Springfield, VA.

TABLE B-2
CRITICAL LIFE STAGE TOXICITY TESTS FOR FRESH WATERS

SPECIES	EFFECT	TEST DURATION	REFERENCE
fathead minnow (Pimephales promelas)	survival; growth rate	7 days	6
water flea (Ceriodaphnia dubia)	survival; number of young	7 days	6
alga (Selenastrum capricornutum)	cell division rate	4 days	6

TOXICITY TEST REFERENCE

6. Horning, W.B. and C.I. Weber (eds.). 1989. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. U.S. EPA Environmental Monitoring Systems Laboratory, Cincinnati, Ohio. EPA/600/4-89/001.

TABLE B-3
TOXICITY TEST REQUIREMENTS FOR STAGE ONE SCREENING PHASE

REQUIREMENTS	RECEIVING WATER CHARACTERISTICS		
	DISCHARGES TO COAST	DISCHARGES TO SAN FRANCISCO BAY‡	
	Ocean	Marine	Freshwater
Taxonomic Diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type			
Freshwater†	0	1 or 2	3
Marine	4	3 or 4	0
Total number of tests	4	5	3

† The fresh water species may be substituted with marine species if:

1) the salinity of the effluent is above 5 parts per thousand (ppt) greater than 75% of the time, or

2) the ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

‡ Marine refers to receiving water salinities greater than 5 ppt at least 75% of the time during a normal water year. Fresh refers to receiving water with salinities less than 5 ppt at least 75% of the time during a normal water year.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

CHRONIC TOXICITY MONITORING REQUIREMENTS

MODIFICATIONS
TO
SELF-MONITORING PROGRAM

FOR

PACIFIC REFINING COMPANY
HERCULES REFINERY

NPDES NO. CA0005096

AS REQUIRED BY

ORDER NO. 92-100
ADOPTED August 19, 1992

I. CHRONIC TOXICITY MONITORING REQUIREMENT

A. Test Species and Frequency: The discharger shall collect 24-hour composite samples on consecutive days of Waste 001 at the compliance point station specified in the Self-Monitoring Program, for critical life stage toxicity testing as indicated below:

Test Species	Frequency[1]
To Be Determined by the Executive Officer	To Be Determined by the Executive Officer

B. Conditions for Accelerated Monitoring: The discharger shall accelerate the frequency of monitoring to monthly (or as otherwise specified by the Executive Officer) when there is an exceedance of either of the following conditions:

1. three sample median value of 10 TUc, or
2. single sample maximum value of 20 TUc

C. Methodology: Sample collection, handling and preservation shall be in accordance with EPA protocols. The test methodology used shall be in accordance with the references cited in Order No. 92-100, or as approved by the Executive Officer. A concurrent reference toxicant test shall be performed for each test.

D. Dilution Series: The discharger shall conduct tests at 100%, 50%, 25%, 10%, 5%, and 2.5%. The "%" represents percent effluent as discharged. The 100% dilution may be omitted if the marine test species specified is sensitive to artificial sea salts.

II. CHRONIC TOXICITY REPORTING REQUIREMENTS

A. Routine Reporting: Toxicity test results for the current reporting period shall include at a minimum, for each test

1. sample date(s)
2. test initiation date
3. test species

[1] After at least twelve test rounds, the discharger may request the Executive Officer to decrease the required frequency of testing, and/or to reduce the number of compliance species to one. Such a request may be made only if toxicity exceeding the TUc values specified in the effluent limitations was never observed using that test species.

4. end point values for each dilution (e.g. number of young, growth rate, percent survival)
5. NOEC value(s) in percent effluent
6. IC_{10}, IC_{15}, IC_{25}, and IC_{50} values (or EC_{10}, EC_{15} ... etc.) in percent effluent
7. TUc values (100/NOEC, $100/IC_{25}$, and $100/EC_{25}$)
8. Mean percent mortality ($\pm$s.d.) after 96 hours in 100% effluent (if applicable)
9. NOEC and LOEC values for reference toxicant test(s)
10. IC_{50} or EC_{50} value(s) for reference toxicant test(s)
11. Available water quality measurements for each test (e.g. pH, D.O, temperature, conductivity, hardness, salinity, ammonia)

B. Compliance Summary: Each self-monitoring report shall include a summary table of chronic toxicity data from at least eleven of the most recent samples. The information in the table shall include the items listed above under Section A item numbers 1, 3, 5, 6(IC_{25} or EC_{25}), 7, and 8.

C. Reporting Raw Data in Electronic Format: On a quarterly basis, by February 15, May 15, August 15, and December 15 of each year, the discharger shall report all chronic toxicity data for the previous calendar quarter in the format specified by the Statewide Chronic Toxicity Database Management System.